NUMERICAL SKILLS/PRE-ALGEBRA PLACEMENT

(Averages: Means, Medians, and Modes)
1. What is the average (arithmetic mean) of 8, 7, 7, 5, 3, 2, and 2?
   A. \( \frac{3}{7} \)
   B. \( \frac{4}{6} \)
   C. \( \frac{5}{7} \)
   D. 5
   E. 6

(Basic Operations with Decimals)
2. Ben is making wooden toys for the next arts and crafts sale. Each toy costs Ben $1.80 to make. If he sells the toys for $3.00 each, how many will he have to sell to make a profit of exactly $36.00?
   A. 12
   B. 20
   C. 30
   D. 60
   E. 108

(Basic Operations with Fractions)
3. How many yards of material from a 24-yard length of cloth remain after 3 pieces, each \( 3\frac{1}{2} \) yards long, and 5 pieces, each \( 2\frac{1}{4} \) yards long, are removed?
   A. \( \frac{1}{4} \)
   B. \( \frac{4}{4} \)
   C. \( \frac{4}{5} \)
   D. \( \frac{10}{4} \)
   E. \( \frac{10}{5} \)

Answers:
1. C 2. C 3. A
(Percentages)
4. Phillip charged $400 worth of goods on his credit card. On his first bill, he was not charged any interest, and he made a payment of $20. He then charged another $18 worth of goods. On his second bill a month later, he was charged 2% interest on his entire unpaid balance. How much interest was Phillip charged on his second bill?

A. $8.76
B. $7.96
C. $7.60
D. $7.24
E. $6.63

Answers:
4. B

ALGEBRA PLACEMENT

(Elementary Algebra: Linear Equations in One Variable)
1. A student has earned scores of 87, 81, and 88 on the first 3 of 4 tests. If the student wants an average (arithmetic mean) of exactly 87, what score must she earn on the fourth test?
A. 85
B. 86
C. 87
D. 92
E. 93

(Elementary Algebra: Basic Operations with Polynomials)
2. Which of the following expressions represents the product of 3 less than twice x and 2 more than the quantity 3 times x?
A. \(-6x^2 + 25x + 6\)
B. \(6x^2 + 5x + 6\)
C. \(6x^2 - 5x + 6\)
D. \(6x^2 - 5x - 6\)
E. \(6x^2 - 13x - 6\)

(Elementary Algebra: Substituting Values into Algebraic Expressions)
3. If \(x = -1\) and \(y = 2\), what is the value of the expression \(2x^2 - 3xy\) ?
A. 8
B. 4
C. -1
D. -4
E. -8

Answers:
(Intermediate Algebra: Rational Expressions)

4. For all \( r \geq 2 \), \( \frac{r^2 - 5r + 6}{r^2 - 4} = ? \)
   - A. \( r + 2 \)
   - B. \( r - 2 \)
   - C. \( r + 2 \)
   - D. \( r - 2 \)
   - E. \( r + 2 \)

(Coordinate Geometry: Linear Equations in Two Variables)

5. What is the equation of the line that contains the points with \((x, y)\) coordinates \((-3, 7)\) and \((5, -1)\) ?
   - A. \( y = 3x - 2 \)
   - B. \( y = x + 10 \)
   - C. \( y = \frac{-3}{2}x + 8 \)
   - D. \( y = -2x + 4 \)
   - E. \( y = -x + 4 \)

Answers:
4. A 5. E

COLLEGE ALGEBRA PLACEMENT

(Complex Numbers)

1. For \( i = \sqrt{-1} \), if \( 3i(2 + 5i) = x + 6i \), then \( x = ? \)
   - A. \(-15\)
   - B. \(5\)
   - C. \(5i\)
   - D. \(15i\)
   - E. \(27i\)

(Functions)

2. If \( f(4) = 0 \) and \( f(6) = 6 \), which of the following could represent \( f(x) \) ?
   - A. \( \frac{3}{2}x - 4 \)
   - B. \( x + 2 \)
   - C. \( \frac{x - 4}{3} \)
   - D. \( \frac{2}{3}x + 6 \)
   - E. \( 3x - 12 \)

Answers:
1. A 2. E
GEOMETRY PLACEMENT

(Angles)
1. In the figure below, $\overline{AB}$, $\overline{CD}$, and $\overline{EF}$ are parallel, and $\overline{PQ}$ intersects all 3 lines at points R, S, and T, respectively. If the measure of $\angle QTF$ is $33^\circ$, what is the measure of $\angle PRB$?

A. $33^\circ$
B. $57^\circ$
C. $66^\circ$
D. $123^\circ$
E. $147^\circ$

(Triangles)
2. In $\triangle MPB$ below, $\overline{LA} \parallel \overline{MB}$. If $\overline{LM} = \frac{5}{3}$, then $\overline{PA} = ?$

A. $\frac{5}{8}$
B. $\frac{2}{3}$
C. $\frac{3}{5}$
D. $\frac{5}{3}$
E. $\frac{8}{3}$

Answers:

1. E
2. C
TRIGONOMETRY PLACEMENT

(Trigonometric Functions and Identities)
1. Which of the following is equivalent to \( \frac{1 - \cos^2 \theta}{\cos^2 \theta} \)?
   A. \( \sec^2 \theta \)
   B. \( (\csc^2 \theta) - 1 \)
   C. \( \tan^2 \theta \)
   D. \( \sin^2 \theta \)
   E. \( \frac{1}{\sin^2 \theta} \)

(Right-Triangle Trigonometry)
2. From a point on the ground the angle of elevation to a ledge on a building is 27\(^o\), and the distance to the base of the building is 45 meters. How many meters high is the ledge?
   A. \( \frac{45}{\sin 27^o} \)
   B. \( \frac{45}{\tan 27^o} \)
   C. \( 45 \sin 27^o \)
   D. \( 45 \cos 27^o \)
   E. \( 45 \tan 27^o \)

Answers:
1. C 2. E